Local Government Energy Audit Report

West New York Public School No. 5

April 1, 2022

Prepared for:
West New York Board of Education
5401 Hudson Ave
West New York, New Jersey 07093

Prepared by:
TRC
317 George Street
New Brunswick, New Jersey 08901

Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities and help prioritize specific measures for implementation. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

TRC reviewed the energy conservation measures and estimates of energy savings for technical accuracy. Actual, achieved energy savings depend on behavioral factors and other uncontrollable variables and, therefore, estimates of final energy savings are not guaranteed. TRC and the New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

TRC bases estimated material and labor costs primarily on RS Means cost manuals as well as on our experience at similar facilities. This approach is based on standard cost estimating manuals and is vendor neutral. Cost estimates include material and labor pricing associated with one for one equipment replacements. Cost estimates do not include demolition or removal of hazardous waste. The actual implementation costs for energy savings projects are anticipated to be significantly higher based on the specific conditions at your site(s). We strongly recommend that you work with your design engineer or contractor to develop actual project costs for your specific scope of work for the installation of high efficiency equipment. We encourage you to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on selected products and installers. TRC and NJBPU do not guarantee cost estimates and shall in no event be held liable should actual installed costs vary from these material and labor estimates.

Incentive values provided in this report are estimated based of previously run state efficiency programs. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available utility program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

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ENERGY EFFICIENCY INCENTIVE & REBATE TRANSITION

For the purposes of your LGEA, estimated incentives and rebates are included as placeholders for planning purposes. New Jersey utilities are rolling out their own energy efficiency programs, which your project may be eligible for depending on individual measures, quantities, and size of the building.

In 2018, Governor Murphy signed into law the landmark legislation known as the Clean Energy Act. The law called for a significant overhaul of New Jersey's clean energy systems by building sustainable infrastructure in order to fight climate change and reduce carbon emissions, which will in turn create well-paying local jobs, grow the state's economy, and improve public health while ensuring a cleaner environment for current and future residents.

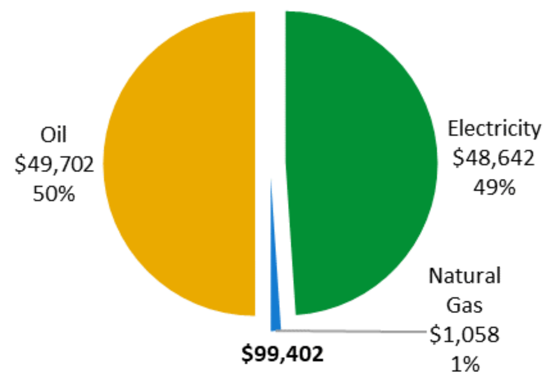
These next generation energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). All of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs and incentives directly to customers like you. NJCEP will still offer programs for new construction, renewable energy, the Energy Savings Improvement Program (ESIP), and large energy users.

New utility programs are under development. Keep up to date with developments by visiting the NJCEP website.

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for WNY Public School 5. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and to help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $99,402 Electricity: 357,865 kWh Natural Gas: 1,062 Therms No. 2 Fuel Oil: 24,205 Gallons	
ENERGY STAR® Benchmarking Score	84 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

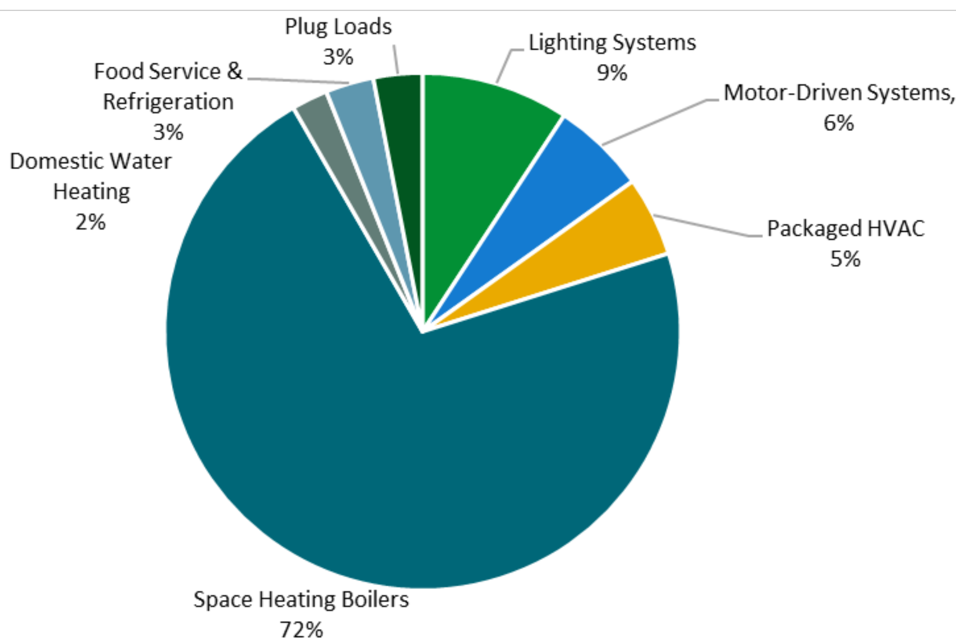


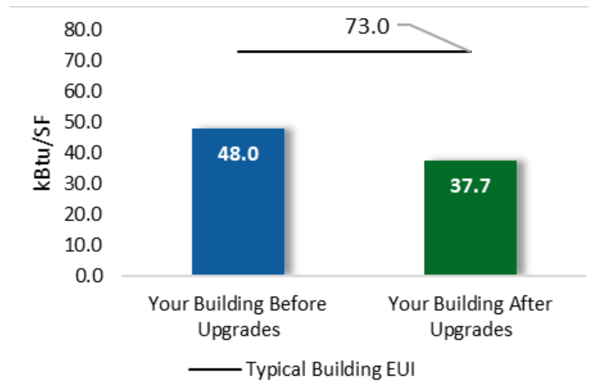
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

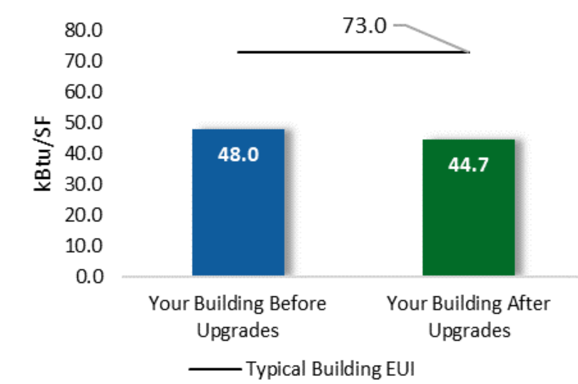
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$557,687
Potential Rebates & Incentives[1]	$23,984
Annual Cost Savings	$26,206
Annual Energy Savings	Electricity: 133,824 kWh Natural Gas: 215 Therms No. 2 Fuel Oil: 3,800 Gallons
Greenhouse Gas Emission Savings	112 Tons
Simple Payback	20.4 Years
Site Energy Savings (All Utilities)	21%



Scenario 2: Cost Effective Package[2]

Installation Cost	$67,183
Potential Rebates & Incentives	$16,601
Annual Cost Savings	$13,635
Annual Energy Savings	Electricity: 103,696 kWh Natural Gas: 69 Therms No. 2 Fuel Oil: -257 Gallons
Greenhouse Gas Emission Savings	50 Tons
Simple Payback	3.7 Years
Site Energy Savings (all utilities)	7%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on previously run state rebate programs. Contact your utility provider for current program incentives that may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**66,992**	**17.6**	**-28**	**$8,695**	**$28,462**	**$7,652**	**$20,810**	**2.4**	**62,928**
ECM 1	Install LED Fixtures	Yes	648	0.0	0	$88	$412	$100	$312	3.5	653
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	189	0.1	0	$25	$266	$40	$226	9.2	178
ECM 3	Retrofit Fixtures with LED Lamps	Yes	66,155	17.5	-28	$8,583	$27,783	$7,512	$20,271	2.4	62,098
Lighting Control Measures			**18,964**	**5.0**	**-8**	**$2,460**	**$28,065**	**$6,695**	**$21,370**	**8.7**	**17,800**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	16,336	4.3	-7	$2,119	$23,340	$2,980	$20,360	9.6	15,333
ECM 5	Install High/Low Lighting Controls	Yes	2,628	0.7	-1	$341	$4,725	$3,715	$1,010	3.0	2,467
Variable Frequency Drive (VFD) Measures			**24,900**	**10.6**	**0**	**$3,384**	**$32,779**	**$6,400**	**$26,379**	**7.8**	**25,074**
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	17,121	5.7	0	$2,327	$10,303	$2,200	$8,103	3.5	17,240
ECM 7	Install VFDs on Chilled Water Pumps	No	2,545	2.0	0	$346	$8,394	$1,800	$6,594	19.1	2,563
ECM 8	Install VFDs on Heating Water Pumps	No	5,234	2.9	0	$711	$14,082	$2,400	$11,682	16.4	5,271
Unitary HVAC Measures			**4,130**	**2.5**	**0**	**$561**	**$28,040**	**$0**	**$28,040**	**50.0**	**4,159**
ECM 9	Install High Efficiency Air Conditioning Units	No	4,130	2.5	0	$561	$28,040	$0	$28,040	50.0	4,159
Electric Chiller Replacement			**3,426**	**3.2**	**0**	**$466**	**$55,002**	**$800**	**$54,202**	**116.4**	**3,450**
ECM 10	Install High Efficiency Chillers	No	3,426	3.2	0	$466	$55,002	$800	$54,202	116.4	3,450
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**230**	**$3,406**	**$160,935**	**$0**	**$160,935**	**47.3**	**37,611**
ECM 11	Install High Efficiency Hot Water Boilers	No	0	0.0	230	$3,406	$160,935	$0	$160,935	47.3	37,611
HVAC System Improvements			**0**	**0.0**	**7**	**$68**	**$50**	**$14**	**$36**	**0.5**	**803**
ECM 12	Install Pipe Insulation	Yes	0	0.0	7	$68	$50	$14	$36	0.5	803
Domestic Water Heating Upgrade			**0**	**0.0**	**15**	**$146**	**$38,648**	**$2,083**	**$36,566**	**250.2**	**1,719**
ECM 13	Install High Efficiency Gas-Fired Water Heater	No	0	0.0	15	$146	$38,648	$2,083	$36,566	250.2	1,719
Food Service & Refrigeration Measures			**618**	**0.0**	**0**	**$84**	**$303**	**$40**	**$263**	**3.1**	**623**
ECM 14	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	618	0.0	0	$84	$303	$40	$263	3.1	623
Custom Measures			**14,793**	**0.0**	**332**	**$6,935**	**$185,402**	**$0**	**$185,402**	**26.7**	**69,274**
ECM 15	Installation of an Energy Management System	No	14,793	0.0	332	$6,935	$185,402	$0	$185,402	26.7	69,274
TOTALS (COST EFFECTIVE MEASURES)			**103,696**	**28.4**	**-29**	**$13,635**	**$67,183**	**$16,601**	**$50,582**	**3.7**	**99,394**
TOTALS (ALL MEASURES)			**133,824**	**38.9**	**548**	**$26,206**	**$557,687**	**$23,684**	**$534,003**	**20.4**	**223,440**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Figure 2 – Evaluated Energy Improvements

For more detail on each evaluated energy improvement and a break out of cost-effective improvements, see **Section 4: Energy Conservation Measures.**

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

Utility run energy efficiency programs and New Jersey’s Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

For details on these programs please visit New Jersey's Clean Energy Program website or contact your utility provider.

Options from Around the State

Financing and Planning Support with the Energy Savings Improvement Program (ESIP)

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the ESIP. Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as attractive financing for implementing ECMs. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat and Power (CHP)

The CHP program provides incentives for combined heat and power (i.e., cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces electric loads at commercial facilities when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. By enabling commercial facilities to reduce electric demand during times of peak demand, the grid is made more reliable, and overall transmission costs are reduced for all ratepayers. Curtailment service providers provide regular payments to medium and large consumers of electric power for their participation in demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for WNY Public School 5. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

TRC conducted this study as part of a comprehensive effort to assist New Jersey educational and local government facilities in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

2.1 Site Overview

On October 5, 2021, TRC performed an energy audit at WNY Public School 5 located in West New York, New Jersey. TRC met with Rick Solares and Tony Perez to review the facility operations and help focus our investigation on specific energy-using systems.

WNY Public School 5 is a four-story, 97,580 square foot building built in 1913. Spaces include classrooms and offices, as well as a gymnasium, a cafeteria, a kitchen, computer labs, a library, lounges, corridors, stairwells, restrooms, storage rooms, and electrical and mechanical spaces.

Recent improvements and Facility Concerns

Facility concerns include exterior wall leakage with water filtration issues, leaky single-pane windows, and high electric bills.

2.2 Building Occupancy

The facility is occupied from September to July, with the school year ending for students in July and restarting in September. Weekend occupancy varies, and the facility closes at 6:00 PM on weekdays. During a typical day, the facility is occupied by approximately 70 staff and 800 students.

Building Name	Weekday/Weekend	Operating Schedule
West New York Public School No. 5	Weekday	7:00 AM to 6:00 PM
	Weekend	Varies

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

WNY Public School 5 is a four-floor building with a basement. Building walls are concrete masonry units with a brick facade. The building has a flat, built up, insulated roof with asphalt layering and pebbles. Most parts of the roof are in good condition; however, a small amount of leakage was observed in a few areas.

During the site visit, the new windows were in the process of being installed; however, the windows being replaced were single-pane, double-hung, operable windows with aluminum frames. The glass-to-frame seals were in poor condition. The operable window weather seals were in poor condition, showing evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals. Overall, the building envelope appears in fair condition.

Roof

Windows and facade

Exterior doors

Windows

2.4 Lighting Systems

The primary interior lighting system uses 32W linear fluorescent T8 lamps. Fixture types include 1-lamp, 2-lamp, and 4-lamp, 2- or 4-foot-long troffers and surface mounted fixtures and 2-foot fixtures with U-bend tube lamps. There are also a couple of 75W T12 lamps. Additionally, there are some compact fluorescent lamps (CFL) plug-in lamps serving storage spaces and janitorial closets. A few of the offices, restrooms and corridors use 40W LED troffers and 29W LED linear tubes. Typically, T8 fluorescent lamps use electronic ballasts, and T12 fluorescent lamps use magnetic ballasts.

All the fixtures are in good condition. All exit signs are 2W LED fixtures. Interior lighting levels were generally sufficient. Interior lighting controls in the building are provided by a mixture of wall switches and occupancy sensors. Exterior fixtures include wall packs with 70W metal halide lamps, 26W CFLs, and 40W LED fixtures. All the exterior lighting fixtures are controlled by a timeclock.

Boiler room – LED linear tube

LED Exit Signs

Typical Classroom – 4 foot T8 fixture

26W CFL – Exterior wall pack

Occupancy sensors - Restroom

Interior 40W LED troffers

2-foot U bend T8 fixture - Stairwell

8-foot T12 fixture - Storage

2.5 Air Handling Systems

Unit Ventilators

Airdale® unit ventilators are equipped hot water coils for heating and chilled water coils for cooling. They have supply fan motors and pneumatically controlled outside air dampers and fan coil valves that are connected to the distribution system. They provide heating, cooling, and ventilation to the classrooms. This system appears to be in fair operating condition.

Unit ventilators - Classroom

Unitary Electric HVAC Equipment

Spaces including offices, some classrooms, the library, and lounge areas that use window air conditioning (AC) and mini-split AC units for cooling.

The window AC units have cooling capacities that range from 0.8 – 2.0 tons with an average EER of 10.7. Temperatures are controlled within the units. The split AC units have cooling capacities ranging from 2.5 to 5 tons with an average EER of 11. Temperatures are controlled using programmable thermostats in the respective zones.

All the units beyond their useful life have been evaluated for replacements.

Older Window AC unit

Newer Window AC unit

Mini-Split AC – Lounge

Programmable thermostat - Lounge

Unitary Heating Equipment

One of the stairwells is heated by an electric resistance heater of 3.5 kW capacity. This equipment is controlled by a manual dial thermostat.

Electric resistance heater

Air Handling Units (AHUs)

The gymnasium and the cafeteria are conditioned by two AHUs. These units are equipped with a supply fan motor, hot water heating coils, and chilled water coils for cooling. The supply fan motors are 10 hp, constant speed, and standard efficiency. The air handlers are controlled by integral control systems with limited capabilities. There is no facility building energy management system (EMS); a EMS has been evaluated for this facility.


AHU - Gym

AHU - Cafeteria

2.6 Heating Hot Water Systems

Two fuel oil No.2 fired; Smith Mills® 4500A hot water boilers serve the building heating load. The burners are fully modulating with a nominal efficiency of 79%. The boilers are configured in a lead-lag control scheme. Both boilers are required under high load conditions. Installed in 1994, they are in fair condition.

The hot water is circulated and distributed to the unit ventilators and the air handling units using two 15-hp (P1, P2) constant speed heating hot water pumps. Boiler replacement and the addition of variable frequency (VFD) drives to the existing hot water pumps have both been evaluated.


Boilers

Hot water pumps

Oil pump

Combustion air fan

2.7 Chilled Water Systems

The chiller plant consists of one Trane®, 40-ton, air cooled scroll chiller. The chilled water is distributed to the unit ventilators and the air handling units using two 5 hp (P3, P4) constant speed chilled water pumps.

The original chiller had stopped working during the summer of 2021, and a temporary unit was brought in for use. Hence, chiller usage is included in the evaluation of site energy use, and the defunct unit has been evaluated for replacement.

Trane Chiller

Trane Chiller

2.8 Domestic Hot Water

Hot water is produced by two AO Smith® 100-gallon, gas fired hot water heaters with input capacities 197 and 199 MBH. Fractional horsepower circulation pumps are used to distribute hot water to the end uses. Both the water heaters are beyond their useful lives and have been evaluated for replacement. The pipes are only partially insulated. Existing insulation is in good condition.

DHW

Storage tank

DHW circulation pumps

DHW circulation pumps

2.9 Food Service Equipment

The kitchen has all-electric equipment that is used to prepare lunches students. Most cooking is done using a convection oven. Bulk prepared foods are held in several electric holding cabinets. Equipment is standard efficiency and is in good condition.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Convection oven

Insulated food holding cabinet

2.10 Refrigeration

The kitchen has a refrigerator chest. All equipment is standard efficiency and in good condition. The walk-in refrigerator has an estimated 0.75-ton compressor and a two-fan evaporator. The cooler has evaporator fan and defrost controls. The walk-in medium temperature freezer has a 0.75-ton compressor and a one-fan evaporator with no controls.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Medium temperature freezer

Walk-in cooler

2.11 Plug Load and Vending Machines

The location is doing a great job managing their electrical plug loads. This report makes additional suggestions for ECMs in this area as well as energy efficient best practices.

There are approximately 50 computer workstations throughout the facility. Plug loads throughout the building include general cafe and office equipment. There are classroom typical loads such as smart boards and projectors and typical office loads such as copiers, printers, microwaves, coffee machines, and mini fridges.

There are several residential style refrigerators throughout the building that are used to store food. These vary in condition and efficiency.

Copier

Residential refrigerator

2.12 Water-Using Systems

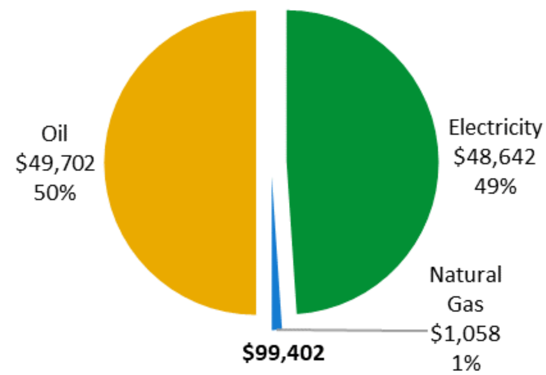
The faucet flow rates are at 1.5 gallons per minute (gpm) and toilets are rated at 1.0 gallons per flush (gpf).

Low-flow faucets

3 Energy Use and Costs

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	357,865 kWh	$48,642
Natural Gas	1,062 Therms	$1,058
No. 2 Fuel Oil	24,205 Gallons	$49,702
Total		**$99,402**



An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

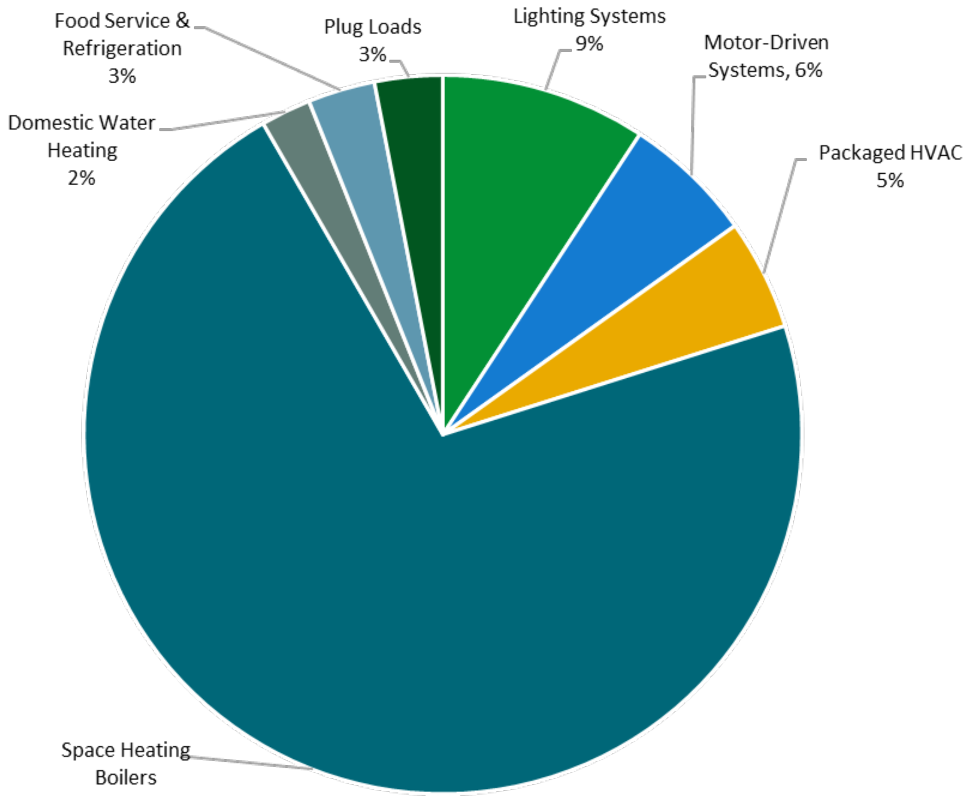
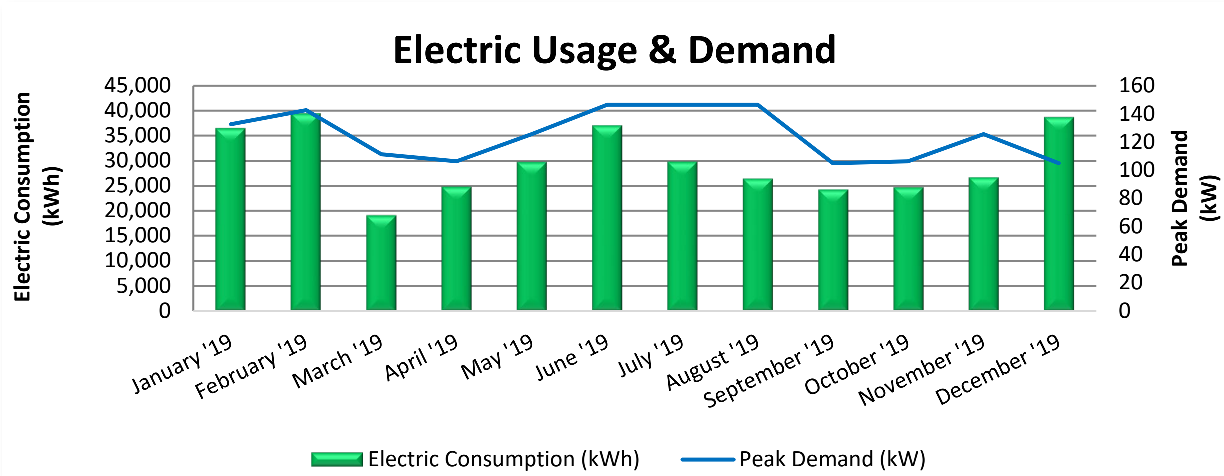


Figure 4 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class GLP, with electric production provided by East Coast Power, a third-party supplier.



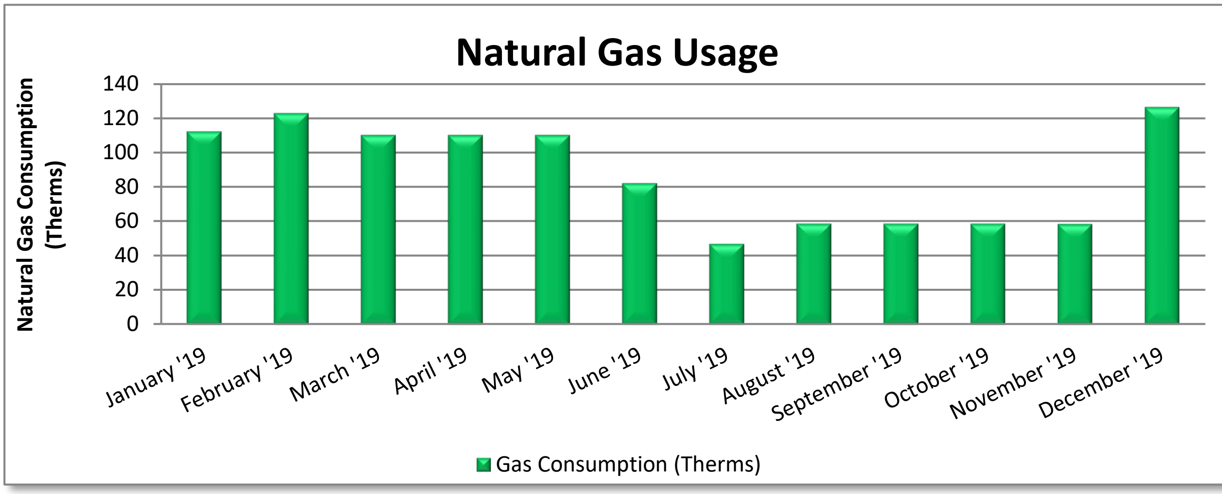
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
1/17/19	30	36,402	133	$497	$4,223
2/15/19	29	39,438	143	$535	$4,590
3/15/19	28	19,097	111	-	$2,772
4/15/19	31	24,771	106	-	$3,596
5/15/19	30	29,750	126	-	$4,318
6/15/19	31	37,005	147	-	$5,371
7/15/19	30	29,785	147	-	$4,323
8/15/19	31	26,390	147	-	$3,831
9/15/19	31	24,239	105	-	$3,518
10/15/19	30	24,699	106	-	$3,585
11/14/19	30	26,636	126	-	$3,866
12/17/19	33	38,673	105	$394	$4,516
Totals	**364**	**356,885**	**147**	**$1,425**	**$48,509**
Annual	**365**	**357,865**	**147**	**$1,429**	**$48,642**

Notes:

- Peak demand of 147 kW occurred in June '19. Demand costs were unavailable for several months due to combined invoicing issues. The total electric costs have been calculated in accordance with the months that have demand charges.
- Average demand over the past 12 months was 125 kW.
- The average electric cost over the past 12 months was $0.136/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

PSE&G delivers natural gas under rate class GSG, with natural gas supply provided by East Coast Power & Gas, a third-party supplier.



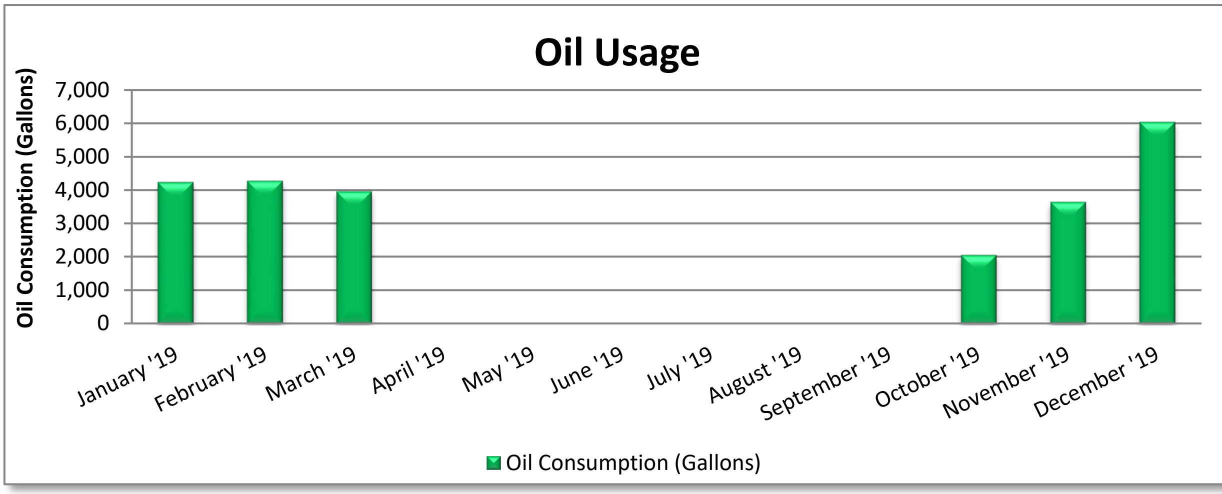
Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
1/18/19	30	112	$128
2/18/19	31	123	$131
3/18/19	28	110	$100
4/18/19	31	110	$100
5/18/19	30	110	$100
6/18/19	31	82	$79
7/18/19	30	47	$51
8/14/19	27	59	$61
9/14/19	31	59	$61
10/14/19	30	59	$61
11/14/19	31	59	$61
12/17/19	33	126	$119
Totals	**363**	**1,057**	**$1,052**
Annual	**365**	**1,062**	**$1,058**

Notes:

- The average gas cost for the past 12 months is $0.996/therm, which is the blended rate used throughout the analysis.

3.3 No. 2 Fuel Oil

Rachle's/Michele's Oil Co. delivers No. 2 fuel oil to the project site.



No. 2 Fuel Oil Billing Data			
Period Ending	Days in Period	Oil Usage (Gallons)	Fuel Cost
1/31/19	30	4,244	$8,331
2/25/19	25	4,285	$8,887
3/21/19	24	3,975	$8,247
4/18/19			
5/18/19			
6/18/19			
7/18/19			
8/14/19			
9/14/19			
10/29/19	222	2,069	$4,234
11/25/29	27	3,649	$7,331
1/2/20	38	6,049	$12,809
Totals	**366**	**24,271**	**$49,838**
Annual	**365**	**24,205**	**$49,702**

Notes:

- The average no. 2 fuel oil cost for the past 12 months is $2.053/Gallon, which is the blended rate used throughout the analysis.
- Fuel deliveries do not necessarily correspond to periods of use.

3.4 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the country, while neutralizing variations due to location, occupancy, and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

Benchmarking Score	84

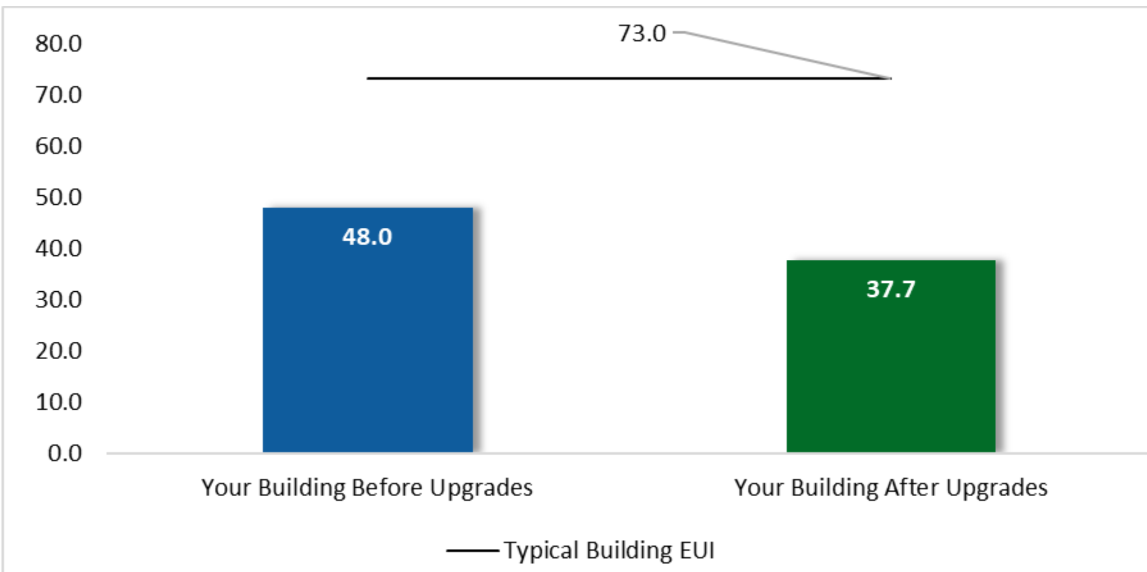


Figure 5 - Energy Use Intensity Comparison[3]

Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. Several factors can cause a building to vary from typical energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

Keeping track of your energy use on a monthly basis is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager regularly, so that you can keep track of your building's performance.

We have created a Portfolio Manager account for your facility, and we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

Free online training is available to help you use ENERGY STAR Portfolio Manager to track your building's performance at: https://www.energystar.gov/buildings/training.

For more information on ENERGY STAR and Portfolio Manager, visit their website.

4 Energy Conservation Measures

The goal of this audit report is to identify and evaluate potential energy efficiency improvements and provide information about the cost effectiveness of those improvements. Most energy conservation measures have received preliminary analysis of feasibility, which identifies expected ranges of savings. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the NJBPU. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives are based on previously run state rebate programs. New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website. Some measures and proposed upgrades may be eligible for higher incentives than those shown below.

For a detailed list of the locations and recommended energy conservation measures for all inventoried equipment, see **Appendix A: Equipment Inventory & Recommendations.**

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**66,992**	**17.6**	**-28**	**$8,695**	**$28,462**	**$7,652**	**$20,810**	**2.4**	**62,928**
ECM 1	Install LED Fixtures	Yes	648	0.0	0	$88	$412	$100	$312	3.5	653
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	189	0.1	0	$25	$266	$40	$226	9.2	178
ECM 3	Retrofit Fixtures with LED Lamps	Yes	66,155	17.5	-28	$8,583	$27,783	$7,512	$20,271	2.4	62,098
Lighting Control Measures			**18,964**	**5.0**	**-8**	**$2,460**	**$28,065**	**$6,695**	**$21,370**	**8.7**	**17,800**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	16,336	4.3	-7	$2,119	$23,340	$2,980	$20,360	9.6	15,333
ECM 5	Install High/Low Lighting Controls	Yes	2,628	0.7	-1	$341	$4,725	$3,715	$1,010	3.0	2,467
Variable Frequency Drive (VFD) Measures			**24,900**	**10.6**	**0**	**$3,384**	**$32,779**	**$6,400**	**$26,379**	**7.8**	**25,074**
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	17,121	5.7	0	$2,327	$10,303	$2,200	$8,103	3.5	17,240
ECM 7	Install VFDs on Chilled Water Pumps	No	2,545	2.0	0	$346	$8,394	$1,800	$6,594	19.1	2,563
ECM 8	Install VFDs on Heating Water Pumps	No	5,234	2.9	0	$711	$14,082	$2,400	$11,682	16.4	5,271
Unitary HVAC Measures			**4,130**	**2.5**	**0**	**$561**	**$28,040**	**$0**	**$28,040**	**50.0**	**4,159**
ECM 9	Install High Efficiency Air Conditioning Units	No	4,130	2.5	0	$561	$28,040	$0	$28,040	50.0	4,159
Electric Chiller Replacement			**3,426**	**3.2**	**0**	**$466**	**$55,002**	**$800**	**$54,202**	**116.4**	**3,450**
ECM 10	Install High Efficiency Chillers	No	3,426	3.2	0	$466	$55,002	$800	$54,202	116.4	3,450
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**230**	**$3,406**	**$160,935**	**$0**	**$160,935**	**47.3**	**37,611**
ECM 11	Install High Efficiency Hot Water Boilers	No	0	0.0	230	$3,406	$160,935	$0	$160,935	47.3	37,611
HVAC System Improvements			**0**	**0.0**	**7**	**$68**	**$50**	**$14**	**$36**	**0.5**	**803**
ECM 12	Install Pipe Insulation	Yes	0	0.0	7	$68	$50	$14	$36	0.5	803
Domestic Water Heating Upgrade			**0**	**0.0**	**15**	**$146**	**$38,648**	**$2,083**	**$36,566**	**250.2**	**1,719**
ECM 13	Install High Efficiency Gas-Fired Water Heater	No	0	0.0	15	$146	$38,648	$2,083	$36,566	250.2	1,719
Food Service & Refrigeration Measures			**618**	**0.0**	**0**	**$84**	**$303**	**$40**	**$263**	**3.1**	**623**
ECM 14	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	618	0.0	0	$84	$303	$40	$263	3.1	623
Custom Measures			**14,793**	**0.0**	**332**	**$6,935**	**$185,402**	**$0**	**$185,402**	**26.7**	**69,274**
ECM 15	Installation of an Energy Management System	No	14,793	0.0	332	$6,935	$185,402	$0	$185,402	26.7	69,274
TOTALS			**133,824**	**38.9**	**548**	**$26,206**	**$557,687**	**$23,684**	**$534,003**	**20.4**	**223,440**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**66,992**	**17.6**	**-28**	**$8,695**	**$28,462**	**$7,652**	**$20,810**	**2.4**	**62,928**
ECM 1	Install LED Fixtures	648	0.0	0	$88	$412	$100	$312	3.5	653
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	189	0.1	0	$25	$266	$40	$226	9.2	178
ECM 3	Retrofit Fixtures with LED Lamps	66,155	17.5	-28	$8,583	$27,783	$7,512	$20,271	2.4	62,098
Lighting Control Measures		**18,964**	**5.0**	**-8**	**$2,460**	**$28,065**	**$6,695**	**$21,370**	**8.7**	**17,800**
ECM 4	Install Occupancy Sensor Lighting Controls	16,336	4.3	-7	$2,119	$23,340	$2,980	$20,360	9.6	15,333
ECM 5	Install High/Low Lighting Controls	2,628	0.7	-1	$341	$4,725	$3,715	$1,010	3.0	2,467
Variable Frequency Drive (VFD) Measures		**17,121**	**5.7**	**0**	**$2,327**	**$10,303**	**$2,200**	**$8,103**	**3.5**	**17,240**
ECM 6	Install VFDs on Constant Volume (CV) Fans	17,121	5.7	0	$2,327	$10,303	$2,200	$8,103	3.5	17,240
HVAC System Improvements		**0**	**0.0**	**7**	**$68**	**$50**	**$14**	**$36**	**0.5**	**803**
ECM 12	Install Pipe Insulation	0	0.0	7	$68	$50	$14	$36	0.5	803
Food Service & Refrigeration Measures		**618**	**0.0**	**0**	**$84**	**$303**	**$40**	**$263**	**3.1**	**623**
ECM 14	Refrigerator/Freezer Case Electrically Commutated Motors	618	0.0	0	$84	$303	$40	$263	3.1	623
TOTALS		**103,696**	**28.4**	**-29**	**$13,635**	**$67,183**	**$16,601**	**$50,582**	**3.7**	**99,394**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Figure 7 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**66,992**	**17.6**	**-28**	**$8,695**	**$28,462**	**$7,652**	**$20,810**	**2.4**	**62,928**
ECM 1	Install LED Fixtures	648	0.0	0	$88	$412	$100	$312	3.5	653
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	189	0.1	0	$25	$266	$40	$226	9.2	178
ECM 3	Retrofit Fixtures with LED Lamps	66,155	17.5	-28	$8,583	$27,783	$7,512	$20,271	2.4	62,098

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources is proposed, we suggest converting all of a specific lighting type (e.g., linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing fixtures containing high intensity discharge (HID) lamps with new LED light fixtures. This measure saves energy by installing LEDs, which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofit with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

Maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: exterior fixtures.

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit fluorescent fixtures by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

The measure uses the existing fixture housing but replaces the electric components with more efficient lighting technology, which use less power than other lighting technologies but provides equivalent lighting output. Maintenance savings may also be achieved since LED tubes last longer than fluorescent tubes and, therefore, do not need to be replaced as often.

Affected building areas: all areas with fluorescent fixtures with T12 tubes.

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent and CFL lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies. Be sure to specify replacement lamps that are compatible with existing dimming controls, where applicable. In some circumstances, you may need to upgrade your dimming system for optimum performance.

This measure saves energy by installing LEDs, which use less power than other lighting technologies yet provide equivalent lighting output for the space. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

Affected Building Areas: all areas with fluorescent fixtures with T8 tubes and CFLs.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**18,964**	**5.0**	**-8**	**$2,460**	**$28,065**	**$6,695**	**$21,370**	**8.7**	**17,800**
ECM 4	Install Occupancy Sensor Lighting Controls	16,336	4.3	-7	$2,119	$23,340	$2,980	$20,360	9.6	15,333
ECM 5	Install High/Low Lighting Controls	2,628	0.7	-1	$341	$4,725	$3,715	$1,010	3.0	2,467

Lighting controls reduce energy use by turning off or lowering lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 4: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend that lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected Building Areas: offices, conference rooms, classrooms, gymnasium, library, restrooms, and storage rooms.

ECM 5: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety code requirements for egress. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

The controller lowers the light level by dimming the fixture output. Therefore, the controlled fixtures need to have a dimmable ballast or driver. This will need to be considered when selecting retrofit lamps and bulbs for the areas proposed for high/low control.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as occupants approach the area.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

Affected Building Areas: hallways and stairwells.

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**24,900**	**10.6**	**0**	**$3,384**	**$32,779**	**$6,400**	**$26,379**	**7.8**	**25,074**
ECM 6	Install VFDs on Constant Volume (CV) Fans	17,121	5.7	0	$2,327	$10,303	$2,200	$8,103	3.5	17,240
ECM 7	Install VFDs on Chilled Water Pumps	2,545	2.0	0	$346	$8,394	$1,800	$6,594	19.1	2,563
ECM 8	Install VFDs on Heating Water Pumps	5,234	2.9	0	$711	$14,082	$2,400	$11,682	16.4	5,271

VFDs control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new inverter duty rated motor to conservatively account for the cost of an inverter duty rated motor.

ECM 6: Install VFDs on Constant Volume (CV) Fans

Install VFDs to control constant volume fan motor speeds. This converts a constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor if the air handler has one.

Zone thermostats signal the VFD to adjust fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature.

Energy savings result from reducing the fan speed (and power) when conditions allow for reduced air flow.

Affected Air Handlers: AHU 3: Cafeteria, AHU 5: Gym.

ECM 7: Install VFDs on Chilled Water Pumps

We evaluated installing VFDs to control chilled water pumps. Two-way valves must serve the chilled water coils being served and the chilled water loop must have a differential pressure sensor installed. If three-way valves or a bypass leg are used in the chilled water distribution, they will need to be modified when this measure is implemented. As the chilled water valves close, the differential pressure increases, and the VFD modulates the pump speed to maintain a differential pressure setpoint.

For systems with variable chilled water flow through the chiller, the minimum flow to prevent the chiller from tripping off will need to be determined during the final project design. The control system should be programmed to maintain the minimum flow through the chiller and to prevent pump cavitation.

Energy savings result from reducing the pump motor speed (and power) as chilled water valves close. The magnitude of energy savings is based on the estimated amount of time that the system operates at reduced loads.

Affected Pumps: P3 and P4: chilled water pumps.

ECM 8: Install VFDs on Heating Water Pumps

We evaluated installing VFDs to control heating water pumps. Two-way valves must serve the hot water coils, and the hot water loop must have a differential pressure sensor installed. If three-way valves or a bypass leg are used in the hot water distribution, they will need to be modified when this measure is implemented. As the hot water valves close, the differential pressure increases and the VFD modulates the pump speed to maintain a differential pressure setpoint.

Energy savings result from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

Affected Pumps: P1 and P2: heating hot water pumps.

4.4 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**4,130**	**2.5**	**0**	**$561**	**$28,040**	**$0**	**$28,040**	**50.0**	**4,159**
ECM 9	Install High Efficiency Air Conditioning Units	4,130	2.5	0	$561	$28,040	$0	$28,040	50.0	4,159

Replacing the unitary HVAC units has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When the window AC and the ductless mini-split AC units is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling and heating load, and the estimated annual operating hours.

Affected Units: Window AC and ductless mini-split AC units.

4.5 Electric Chillers

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Chiller Replacement		**3,426**	**3.2**	**0**	**$466**	**$55,002**	**$800**	**$54,202**	**116.4**	**3,450**
ECM 10	Install High Efficiency Chillers	3,426	3.2	0	$466	$55,002	$800	$54,202	116.4	3,450

ECM 10: Install High Efficiency Chillers

We evaluated replacing the older inefficient electric chillers with a new high efficiency chiller. The type of chiller to be installed depends on the magnitude of the cooling load and variability of the cooling load profile, for example:

- Positive displacement chillers are usually under 600 tons of cooling capacity, and centrifugal chillers generally start at 150 tons of cooling capacity.
- Constant speed chillers should be used to meet cooling loads with little or no variation, while variable speed chillers are more efficient for variable cooling load profiles.
- Water cooled chillers are more efficient than air cooled chillers but require cooling towers and additional pumps to circulate the cooling water.
- In any given size range, variable speed chillers tend to have better partial load efficiency, but worse full load efficiency, than constant speed chillers.

Energy savings result from the improvement in chiller efficiency and matching the right type of chiller to the cooling load. The energy savings are calculated based on the cooling capacity of the new chiller, the improvement in efficiency compared with the base case equipment, the cooling load profile, and the estimated annual operating hours of the chiller before and after the upgrade.

For the purposes of this analysis, we evaluated the replacement of chillers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your design team to select chillers that are sized appropriately for the cooling load. In some cases, the plant energy use can be reduced by selecting multiple chillers that match the facility load profile, rather than one or two large chillers. This can also improve the chiller plant reliability through increased redundancy. Energy savings are maximized by proper selection of new equipment based on the cooling load profile.

Replacing the chiller has a long payback based on energy savings and may not be justifiable based simply on energy considerations. However, the chiller has reached the end of its normal useful life and has been disconnected. Typically, the marginal cost of purchasing a high-efficiency chiller can be justified by the marginal savings from the improved efficiency. When the chiller is eventually replaced, consider purchasing equipment that exceed the minimum efficiency required by building codes.

4.6 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**230**	**$3,406**	**$160,935**	**$0**	**$160,935**	**47.3**	**37,611**
ECM 11	Install High Efficiency Hot Water Boilers	0	0.0	230	$3,406	$160,935	$0	$160,935	47.3	37,611

ECM 11: Install High Efficiency Hot Water Boilers

We evaluated replacing the older inefficient hot water boilers with high efficiency hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers are evaluated when the return water temperature is less than 130°F during most of the operating hours.

For the purposes of this analysis, we evaluated the replacement of boilers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the heating load. In many cases installing multiple modular boilers, rather than one or two large boilers, will result in higher overall plant efficiency while providing additional system redundancy.

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers have reached the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

4.7 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**0**	**0.0**	**7**	**$68**	**$50**	**$14**	**$36**	**0.5**	**803**
ECM 12	Install Pipe Insulation	0	0.0	7	$68	$50	$14	$36	0.5	803

ECM 12: Install Pipe Insulation

Install insulation on domestic hot water system piping. Distribution system losses are dependent on system fluid temperature, the size of the distribution system, and the level of insulation of the piping. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is exposed to water, when the insulation has been removed from some areas of the pipe, or when valves have not been properly insulated system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

Affected Systems: domestic hot water piping.

4.8 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**15**	**$146**	**$38,648**	**$2,083**	**$36,566**	**250.2**	**1,719**
ECM 13	Install High Efficiency Gas-Fired Water Heater	0	0.0	15	$146	$38,648	$2,083	$36,566	250.2	1,719

ECM 13: Install High Efficiency Gas-Fired Water Heater

We evaluated replacing the existing tank water heater with a high-efficiency condensing tank water heater. Energy savings result from the increased efficiency of the unit, which uses less gas to heat water, and fewer operating hours to maintain the tank water temperature.

4.9 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**618**	**0.0**	**0**	**$84**	**$303**	**$40**	**$263**	**3.1**	**623**
ECM 14	Refrigerator/Freezer Case Electrically Commutated Motors	618	0.0	0	$84	$303	$40	$263	3.1	623

ECM 14: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor motors with electronically commutated (EC) motors in walk-in freezers. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

4.10 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**14,793**	**0.0**	**332**	**$6,935**	**$185,402**	**$0**	**$185,402**	**26.7**	**69,274**
ECM 15	Installation of an Energy Management System	14,793	0.0	332	$6,935	$185,402	$0	$185,402	26.7	69,274

ECM 15: Installation of an EMS

Most larger facilities have some type of EMS, which provides for centralized, remote control and monitoring of HVAC equipment, and sometimes lighting or other building systems. An EMS utilizes a system of temperature and pressure sensors that obtain feedback about field conditions and provide signals to control systems that adjust HVAC system operation for optimal functioning. Thirty years ago, most control systems were pneumatic systems driven by compressed air, with pneumatic thermostats and air driven actuators for valves and dampers. Pneumatic controls have largely been replaced by direct digital control (DDC) systems, but many pneumatic systems remain. Contemporary DDC systems afford tighter controls and enhanced monitoring and trending capabilities as compared to the older systems.

Often smaller facilities are not equipped with central controls. For many small sites, it has been less costly to install distributed local controls, such as programmable thermostats and timeclocks, rather than centralized DDC. Local controls do a reasonably good job of scheduling equipment and maintaining operating conditions by relying on controls integral to HVAC units, such as logic for compressor staging, to manage the equipment operating algorithms.

Even for smaller sites, inefficiencies arise when temperature sensors and thermostat schedules are not maintained, when there are separate systems for heating and cooling, and especially when equipment is added or the facility is reconfigured or repurposed.

Based on our survey, it appears that the installation of an EMS at your site could increase the efficiency of your building HVAC system operation.

A controls upgrade would enable automated equipment start and stop times, temperature setpoints, lockouts and deadbands to be programmed remotely using a graphic interface. Controls can be configured to optimize ventilation and outside air intake by adjusting economizer position, damper function, and fan speed. Existing chilled and hot water distribution system controls are typically tied in, including associated pumps and valves. Coordinated control of HVAC systems is dependent on a network of sensors and status points. A comprehensive building control system provides monitoring and control for all HVAC systems, so operators can adjust system programming for optimal comfort and energy savings.

It is recommended that an HVAC engineer or contractor who specializes in EMS be contacted for a detailed evaluation and implementation costs. For the purposes of this report, the potential energy savings and measure costs were estimated based on industry standards and previous project experience. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis nor should be used as a basis for design and construction.

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. It is a screening evaluation for the potential in installing an EMS. Based on industry standards and previous project experience, the potential energy savings may be up to 20% of existing HVAC energy use. The average cost for installing and EMS may be between $2 and $4 per square foot. Actual savings and costs will need to be outlined by the specific contractor engaged to implement the system. For the purposes of this report, we have conservatively estimated savings to be 10% of the HVAC energy consumption baseline.

4.11 Measures for Future Consideration

There are additional opportunities for improvement that West New York Board of Education may wish to consider. These potential upgrades typically require further analysis, involve substantial capital investment, and/or include significant system reconfiguration. These measure(s) are therefore beyond the scope of this energy audit. These measure(s) are described here to support a whole building approach to energy efficiency and sustainability.

West New York Board of Education may wish to consider the Energy Savings Improvement Program (ESIP) or other whole building approach. With interest in implementing comprehensive, largescale and/or complex system wide projects, these measures may be pursued during development of a future energy savings plan. We recommend that you work with your energy service company (ESCO) and/or design team to:

- Evaluate these measures further.
- Develop firm costs.
- Determine measure savings.
- Prepare detailed implementation plans.

Other modernization or capital improvement funds may be leveraged for these types of refurbishments. As you plan for capital upgrades, be sure to consider the energy impact of the building systems and controls being specified.

Replace Fuel Oil Fired Equipment with Natural Gas Equipment

This site has fuel oil fired boilers to provide space heating. At the utility costs in effect when this study was conducted, fuel oil cost $14.82/MMBtu while natural gas cost $9.96/MMBtu. The facilities staff are considering replacing the fuel oil fired equipment with natural gas fired equipment. Replacing the space heating boilers with natural gas fired boilers with an 80% efficiency would save approximately $16,000 per year in fuel costs primarily due to the lower cost of natural gas.

If the decision is made to replace the space heating boilers, we recommend that the district work with their mechanical design team to select boilers that are sized appropriately for the heating load. In many cases, installing multiple modular boilers, rather than one or two large boilers, will result in higher overall plant efficiency while providing additional system redundancy.

Condensing hydronic boilers can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The condensing boiler efficiency increases as the return water temperature drops below 130°F.

Switching from fuel oil to natural gas will reduce energy costs and reduce CO_2 and other greenhouse gas emissions. From the U.S. Energy Information Administration, the pounds of CO_2 emitted per MMBtu of fuel burned are fuel oil 161.3, natural gas 117.0.

Window Replacements

During the site visit the windows were already undergoing replacement, but the following information provides details on how they will improve your building. Energy efficient windows are an important consideration when improving the building envelope. The heat transfer through the glass panes are responsible for a significant portion of the facility's heating and cooling energy consumption. We recommend replacing single-pane windows with double-pane windows, and we recommend models that are gas-filled with low-e coatings to reduce heat loss. Windows should be selected with low U-factors to maximize energy savings. The U-factor is the rate at which the window conducts non-solar heat flow and is a key indicator of performance. The lower the U-factor, the higher the efficiency of the window. Window frames and sashes should be efficient as well. If metal frames are specified or required by code, the frame extrusions should have a thermal break to reduce conduction through the frame. As part of the installation, the window frames should be properly sealed with caulk materials to ensure the mitigation of air infiltration. Building envelopes that limit air infiltration and that have adequate fenestrations play a key role in optimizing heating and cooling efficiency, controlling moisture, and providing occupant comfort. Window system replacement is an expensive upgrade that generally involves architectural elements. We recommend this as a measure for further study.

5 ENERGY EFFICIENT BEST PRACTICES

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs.

Operation and maintenance (O&M) plans enhance the operational efficiency of HVAC and other energy intensive systems and could save 5% –20% of the energy usage in your building without substantial capital investment. A successful plan includes your records of energy usage trends and costs, building equipment lists, current maintenance practices, and planned capital upgrades, and it incorporates your ideas for improved building operation. Your plan will address goals for energy-efficient operation, provide detail on how to reach the goals, and outline procedures for measuring and reporting whether goals have been achieved.

You may already be doing some of these things—see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR Portfolio Manager

You've heard it before—you cannot manage what you do not measure. ENERGY STAR Portfolio Manager is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[4] . Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Lighting Maintenance

- Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

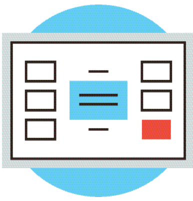
In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

Thermostat Schedules and Temperature Resets



Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. Thermostats should be programmed for a setback of 5-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely and efficiently. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the boiler tubes to improve heat transfer.

Optimize HVAC Equipment Schedules

Energy management systems (EMS) typically provide advanced controls for building HVAC systems, including chillers, boilers, air handling units, rooftop units and exhaust fans. The EMS monitors and reports operational status, schedules equipment start and stop times, locks out equipment operation based on outside air or space temperature, and often optimizes damper and valve operation based on complex algorithms. These EMS features, when in proper adjustment, can improve comfort for building occupants and save substantial energy.

Know your EMS scheduling capabilities. Regularly monitor HVAC equipment operating schedules and match them to building operating hours in order to eliminate unnecessary equipment operation and save energy. Monitoring should be performed often at sites with frequently changing usage patterns – daily in some cases. We recommend using the *optimal start* feature of the EMS (if available) to optimize the building warmup sequence. Most EMS scheduling programs provide for holiday schedules, which can be used during reduced use or shutdown periods. Finally, many systems are equipped with a one-time override function, which can be used to provide additional space conditioning due to a one-time, special event. When available this override feature should be used rather than changing the base operating schedule.

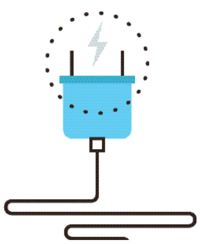
Water Heater Maintenance

The lower the supply water temperature that is used for hand washing sinks, the less energy is needed to heat the water. Reducing the temperature results in energy savings and the change is often unnoticeable to users. Be sure to review the domestic water temperature requirements for sterilizers and dishwashers as you investigate reducing the supply water temperature.

Also, preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- Corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot, or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional.
- For electric water heaters, look for signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank.
- For water heaters more than three years old, have a technician inspect the sacrificial anode annually.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[5]. Your local utility may offer incentives or rebates for this equipment.

[5] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense® ratings for urinals is 0.5 gpf and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense website[6] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. Any reduction in water use does however ultimately reduce grid-level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR or WaterSense products where available.

[6] https://www.epa.gov/watersense.

[7] https://www.epa.gov/watersense/watersense-work-0.

6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions, and reduced customer electricity purchases, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

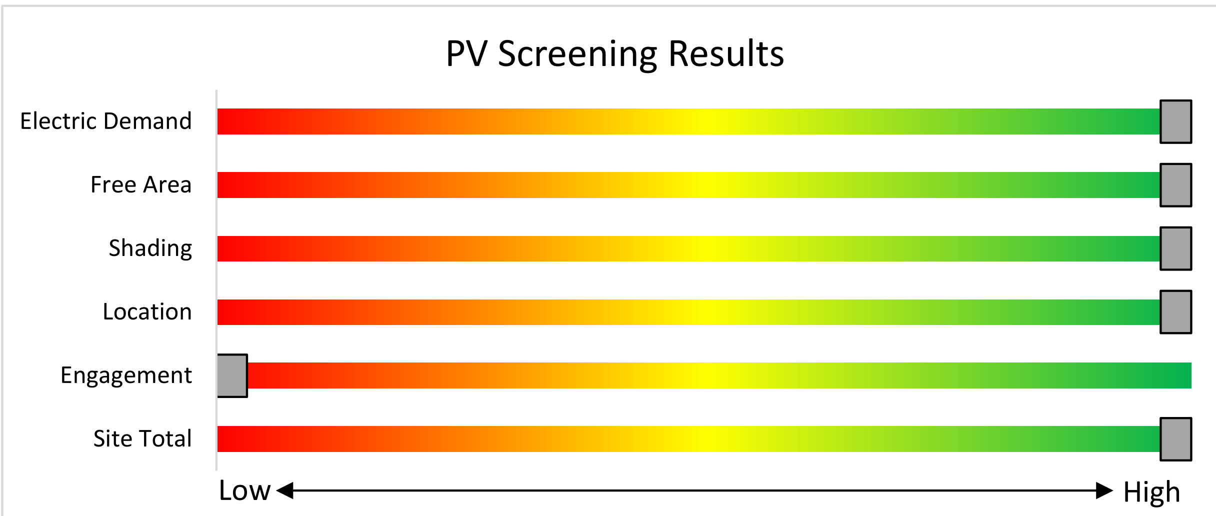
6.1 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has high potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential. A PV array located on the roof may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.



Potential	High	
System Potential	125	kW DC STC
Electric Generation	148,921	kWh/yr
Displaced Cost	$20,240	/yr
Installed Cost	$325,000	

Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available for solar projects. Solar projects may qualify to earn SREC- IIs (Solar Renewable Energy Certificates-II), however, the project owners *must* register their solar projects prior to the start of construction to establish the project's eligibility.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

Successor Solar Incentive Program (SuSI): https://www.njcleanenergy.com/renewable-energy/programs/susi-program

- **Basic Info on Solar PV in NJ**: www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs.
- **Approved Solar Installers in the NJ Market**: www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1

6.2 Combined Heat and Power

Combined heat and power (CHP) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need for large quantities of waste heat are the best candidates for CHP.

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has no potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. Low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

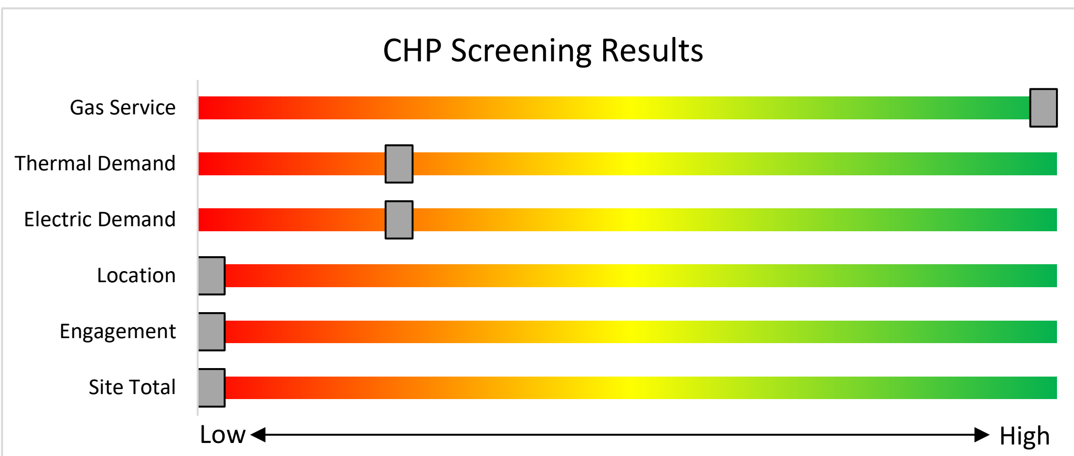


Figure 9 - Combined Heat and Power Screening

Find a qualified firm that specializes in commercial CHP cost assessment and installation: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/

7 Project Funding and Incentives

Ready to improve your building's performance? Your utility provider may be able to help.

7.1 Utility Energy Efficiency Programs

Ready to improve your building's performance? Your utility provider may be able to help.

New utility programs are expected to start rolling out in the spring and summer of 2021. Keep up to date with developments by visiting the NJCEP website.

8 NEW JERSEY'S CLEAN ENERGY PROGRAMS

New Jersey's Clean Energy Program will continue to offer some energy efficiency programs.

8.1 Combined Heat and Power

The Combined Heat & Power (CHP) program provides incentives for eligible CHP or waste heat to power (WHP) projects. Eligible CHP or WHP projects must achieve an annual system efficiency of at least 65% (lower heating value, or LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

Incentives

Eligible Technologies	Size (Installed Rated Capacity)[1]	Incentive ($/kW)	% of Total Cost Cap per Project[3]	$ Cap per Project[3]
Powered by non-renewable or renewable fuel source[4]	≤500 kW	$2,000	30-40%[2]	$2 million
Gas Internal Combustion Engine	>500 kW - 1 MW	$1,000		
Gas Combustion Turbine	> 1 MW - 3 MW	$550	30%	$3 million
Microturbine	>3 MW	$350		
Fuel Cells with Heat Recovery				
Waste Heat to Power*	<1 MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, current incentive levels, and requirements.

How to Participate

You will work with a qualified developer or consulting firm to complete the CHP application. Once the application is approved the project can be installed. Information about the CHP program can be found at www.njcleanenergy.com/CHP.

8.2 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. An ESIP is a type of performance contract, whereby school districts, counties, municipalities, housing authorities, and other public and state entities enter in to contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the energy conservation measures (ECMs), ensuring that ESIP projects are cash flow positive for the life of the contract.

ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

This LGEA report is the first step to participating in ESIP. Next, you will need to select an approach for implementing the desired ECMs:

(1) Use an energy services company or "ESCO."

(2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.

(3) Use a hybrid approach of the two options described above where the ESCO is used for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

After adopting a resolution with a chosen implementation approach, the development of the energy savings plan can begin. The ESP demonstrates that the total project costs of the ECMs are offset by the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at www.njcleanenergy.com/ESIP.

ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.

8.3 Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The program is used to register and certify solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn SREC-IIs (Solar Renewable Energy Certificates-II). SuSI consists of two sub-programs. The Administratively Determined Incentive (ADI) Program and the Competitive Solar Incentive (CSI) Program.

Administratively Determined Incentive (ADI) Program

The ADI Program provides administratively set incentives for net metered residential projects, net metered non-residential projects 5 MW or less, and all community solar projects.

After the registration is accepted, construction is complete, and a complete final as-built packet has been submitted, the project is issued a New Jersey certification number, which enables it to generate New Jersey SREC- IIs.

Market Segments	Size MW dc	Incentive Value ($/SREC II)	Public Entities Incentive Value - $20 Adder ($/SRECII)
Net Metered Residential	All types and sizes	$90	N/A
Small Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects smaller than 1 MW	$100	$120
Large Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects 1 MW to 5 MW	$90	$110
Small Net Metered Non-Residential Ground Mount	Projects smaller than 1 MW	$85	$105
Large Net Metered Non-Residential Ground Mount	Projects 1 MW to 5 MW	$80	$100
LMI Community Solar	Up to 5 MW	$90	N/A
Non-LMI Community Solar	Up to 5 MW	$70	N/A
Interim Subsection (t)	All types and sizes	$100	N/A

Eligible projects may generate SREC-IIs for 15 years following the commencement of commercial operations which is defined as permission to operate (PTO) from the Electric Distribution Company. After 15 years, projects may be eligible for a NJ Class I REC.

SREC-IIs will be purchased monthly by the SREC-II Program Administrator who will allocate the SREC-IIs to the Load Serving Entities (BGS Providers and Third-Party Suppliers) annually based on their market share of retail electricity sold during the relevant Energy Year.

The ADI Program online portal is now open to new registrations effective August 28, 2021.

Competitive Solar Incentive Program

The Competitive Solar Incentive (CSI) Program will provide competitively set incentives for grid supply projects and net metered non-residential projects greater than 5MW. The program is currently under development with the goal of holding the first solicitation by early-to-mid 2022. For updates, please continue to check the Solar Proceedings page on the New Jersey's Clean Energy Program website.

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan.

If you are considering installing solar photovoltaics on your building, visit the following link for more information: https://njcleanenergy.com/renewable-energy/programs/susi-program.

9 PROJECT DEVELOPMENT

Energy conservation measures (ECMs) have been identified for your site, and their energy and economic analyses are provided within this LGEA report. Note that some of the identified projects may be mutually exclusive, such as replacing equipment versus upgrading motors or controls. The next steps with project development are to set goals and create a comprehensive project plan. The graphic below provides an overview of the process flow for a typical energy efficiency or renewable energy project. We recommend implementing as many ECMs as possible prior to undertaking a feasibility study for a renewable project. The cyclical nature of this process flow demonstrates the ongoing work required to continually improve building energy efficiency over time. If your building(s) scope of work is relatively simple to implement or small in scope, the measurement and verification (M&V) step may not be required. It should be noted through a typical project cycle, there will be changes in costs based on specific scopes of work, contractor selections, design considerations, construction, etc. The estimated costs provided throughout this LGEA report demonstrate the unburdened turn-key material and labor cost only. There will be contingencies and additional costs at the time of implementation. We recommend comprehensive project planning that includes the review of multiple bids for project work, incorporates potential operations and maintenance (O&M) cost savings, and maximizes your incentive potential.

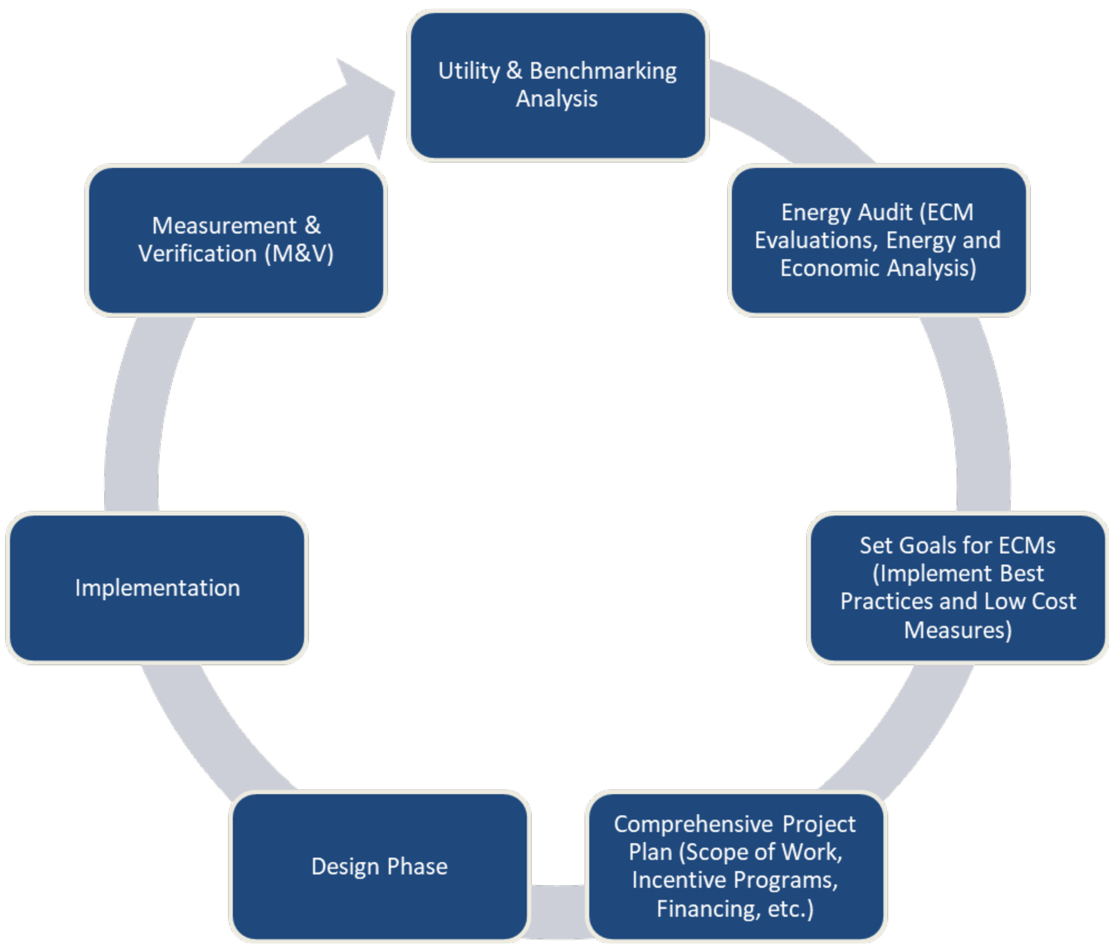


Figure 10 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. Though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third-party supplier, consider shopping for a reduced rate from third-party electric suppliers. If your facility already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website[8].

10.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market based and fluctuate monthly. The utility provides basic gas supply service to customers who choose not to buy from a third-party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier typically depends on whether a customer prefers budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third-party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website[9].

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[8] www.state.nj.us/bpu/commercial/shopping.html.

[9] www.state.nj.us/bpu/commercial/shopping.html.

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom 101	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 102	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 103	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 104	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 105	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 106	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 109	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 110	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 111	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 112	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Gymnasium	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Gymnasium	19	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,600	3, 4	Relamp	Yes	19	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,794	1.0	4,020	-2	$522	$1,928	$450	2.8
Gymnasium Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Janitorial 1st	1	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	11.5
Janitorial 1st #2	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,000	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.0	19	0	$2	$18	$5	5.3
Lounge 101a	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	480	0	$62	$416	$75	5.5
Main Office 107	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,600	3, 4	Relamp	Yes	7	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,794	0.4	1,481	-1	$192	$781	$175	3.2
Nurses Office - 108	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Office - CR2	4	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,600	4	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,794	0.0	142	0	$18	$270	$35	12.8
Office - CR2	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,600	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,600	0.0	160	0	$21	$73	$20	2.6
Office - VP	6	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,600	4	None	Yes	6	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,794	0.1	213	0	$28	$270	$35	8.5
Principals Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	480	0	$62	$416	$75	5.5
Restroom - 101a	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,600	3	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,600	0.0	39	0	$5	$16	$3	2.6
Restroom - 112	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,600	3	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,600	0.0	39	0	$5	$16	$3	2.6
Restroom - Female 1st	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	2,600		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,600	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Male 1st	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	2,600		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,600	0.0	0	0	$0	$0	$0	0.0
Restroom - Principal	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Stairs A	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs A	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 5	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,794	0.1	440	0	$57	$353	$260	1.6
Stairs A	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Stairs B	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs B	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 5	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,794	0.1	440	0	$57	$353	$260	1.6
Stairs B	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Stairs C	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs C	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 5	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,794	0.0	189	0	$24	$280	$120	6.5
Stairs C	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 5	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,794	0.2	600	0	$78	$408	$225	2.3
Stairs C	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,600	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,600	0.0	160	0	$21	$73	$20	2.6
Stairs C	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,600	0.0	83	0	$11	$72	$10	5.8
Stairs D	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs D	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 5	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,794	0.1	440	0	$57	$353	$260	1.6
Stairs D	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Stairs E	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs E	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 5	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,794	0.1	440	0	$57	$353	$260	1.6
Stairs E	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Stairs F	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs F	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,794	0.1	480	0	$62	$371	$180	3.1
Storage 1st Floor	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,000	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	1,000	0.0	19	0	$2	$18	$5	5.3
Storage 1st Floor	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,000	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.0	62	0	$8	$73	$20	6.6
Storage Gym #1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	5.6
Storage Gym #2	1	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	11.5

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Storage Gym #3	1	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	11.5
Classroom 201	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 202	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 203	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 204	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 205	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 206	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 207	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 209	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 210	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 211	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 212	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Computer Lab 208	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Corridor 1st	8	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 1st	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 5	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,794	0.3	1,201	-1	$156	$815	$450	2.3
Corridor 2nd	8	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 2nd	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 5	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,794	0.3	1,201	-1	$156	$815	$450	2.3
Electrical IDF 2nd	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	5.6
Janitorial 2nd	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	1,000	3	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,000	0.0	15	0	$2	$16	$3	6.9
Janitorial 2nd #2	1	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	11.5
Lounge 112A	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	480	0	$62	$416	$75	5.5
Lounge 201a	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	240	0	$31	$189	$40	4.8
Office - 207A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	240	0	$31	$189	$40	4.8
Restroom - 201A	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,600	3	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,600	0.0	39	0	$5	$16	$3	2.6
Restroom - Female 2nd	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	2,600		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,600	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Male 2nd	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	2,600		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,600	0.0	0	0	$0	$0	$0	0.0
Classroom 300a	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	721	0	$93	$489	$95	4.2
Classroom 300b	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	600	0	$78	$453	$85	4.7
Classroom 301	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 302	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 303	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 304	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 307	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 308	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 309	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 310	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 311	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 312	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,794	0.4	1,441	-1	$187	$708	$155	3.0
Classroom 312	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,794	0.1	449	0	$58	$560	$75	8.3
Corridor 3rd	8	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 3rd	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	2,600	3, 5	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,794	0.0	126	0	$16	$37	$10	1.6
Corridor 3rd	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 5	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,794	0.2	961	0	$125	$742	$360	3.1
Corridor Library	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,794	0.1	240	0	$31	$73	$20	1.7
Janitorial 3rd	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	5.6
Janitorial 3rd #2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	5.6
Library	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.5	1,921	-1	$249	$1,124	$230	3.6
Lounge 301a	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	240	0	$31	$189	$40	4.8
Office - 306A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	240	0	$31	$189	$40	4.8
Office - 306B	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	240	0	$31	$189	$40	4.8
Restroom - 301A	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,600	0.0	50	0	$6	$18	$5	2.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Female 3rd	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	2,600		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,600	0.0	0	0	$0	$0	$0	0.0
Restroom - Male 3rd	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	2,600		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,600	0.0	0	0	$0	$0	$0	0.0
Storage 312A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.1	92	0	$12	$189	$20	14.1
Classroom 400A	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.3	1,081	0	$140	$599	$125	3.4
Classroom 400B	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 401	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 402	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 403	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 404	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 405	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 406	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 407	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 408	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 409	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 410	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 411	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 412	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.2	961	0	$125	$562	$115	3.6
Classroom 412A	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	240	0	$31	$189	$40	4.8
Corridor 4th	8	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 4th	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	None	S	32	2,600	3, 5	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,794	0.0	126	0	$16	$37	$10	1.6
Corridor 4th	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 5	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,794	0.2	961	0	$125	$517	$305	1.7
Corridor Music	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Janitorial 4th	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	1,000	3	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,000	0.0	15	0	$2	$16	$3	6.9
Janitorial 4th #2	1	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	11.5
Lounge 401a	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	240	0	$31	$189	$40	4.8

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - 401A	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,600	0.0	50	0	$6	$18	$5	2.0
Restroom - Female 4th	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	2,600		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,600	0.0	0	0	$0	$0	$0	0.0
Restroom - Male 4th	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	40	2,600		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	2,600	0.0	0	0	$0	$0	$0	0.0
Storage 400A	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	5.6
Storage 400B	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	5.6
Storage 407	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.1	92	0	$12	$189	$40	12.4
Boiler Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Boiler Room	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	1,000	4	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.0	49	0	$6	$270	$35	36.6
Boiler Room	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	S	58	1,000	4	None	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	690	0.1	79	0	$10	$270	$35	22.9
Boiler Room	1	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	1,000	3	Relamp	No	1	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	1,000	0.0	15	0	$2	$16	$3	6.9
Cafeteria	5	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Cafeteria	25	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,600	4	None	Yes	25	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	40	1,794	0.2	887	0	$115	$540	$70	4.1
Classroom B1	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.5	1,921	-1	$249	$1,124	$230	3.6
Classroom B5	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.5	1,921	-1	$249	$1,124	$230	3.6
Classroom B5	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	None	S	114	2,600	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	None	58	2,600	0.0	160	0	$21	$73	$20	2.6
Classroom B6	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.0	126	0	$16	$153	$30	7.5
Classroom B6	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.5	2,042	-1	$265	$1,161	$240	3.5
Corridor Basement	7	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	7	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Basement	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 5	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,794	0.9	3,603	-2	$467	$2,220	$1,350	1.9
Corridor Basement	2	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	S	110	2,600	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) 8' Lamps	High/Low Control	72	1,794	0.1	345	0	$45	$402	$110	6.5
Corridor Kitchen	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor Kitchen	2	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	40	2,600	5	None	Yes	2	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	40	1,794	0.0	71	0	$9	$225	$70	16.8
Electrical Meter Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.1	139	0	$18	$380	$65	17.5
Janitorial Basement #1	1	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Wall Switch	S	26	1,000	3	Relamp	No	1	LED Lamps: GX23 (Plug-In) Lamps	Wall Switch	19	1,000	0.0	8	0	$1	$13	$1	11.5
Lounge - Boiler Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	480	0	$62	$416	$75	5.5

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical - Cafeteria	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,600	3, 4	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,794	0.1	252	0	$33	$343	$55	8.8
Mechanical - Cafeteria	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,794	0.1	360	0	$47	$380	$65	6.7
Mechanical Elevator Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Office - B4	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Office - B4	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,600	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,794	0.2	846	0	$110	$562	$115	4.1
Office - B4	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,600	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,794	0.2	846	0	$110	$562	$115	4.1
Restroom - B1	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Restroom - Male Basement	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,600	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,600	0.1	566	0	$73	$219	$60	2.2
Stairs 4A	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,600	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,600	0.0	94	0	$12	$37	$10	2.2
Storage - Basement #1	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.2	277	0	$36	$489	$95	11.0
Storage - Basement #2	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	1,000	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	1,000	0.1	95	0	$12	$129	$20	8.9
Storage - Basement #2	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	690	0.1	145	0	$19	$380	$65	16.7
Storage - Basement #3	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.2	231	0	$30	$453	$85	12.3
Storage - Basement #3	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,000	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.0	62	0	$8	$73	$20	6.6
Storage - Basement #3	1	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	S	110	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	1,000	0.0	42	0	$5	$89	$20	12.6
Storage - Basement #4	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,000	3, 4	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	690	0.3	488	0	$63	$708	$155	8.7
Storage - Basement #5	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	5.6
Storage - Boiler Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.1	92	0	$12	$189	$20	14.1
Storage - Paint	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,000	0.0	36	0	$5	$37	$10	5.6
Storage - Stairs B	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.1	92	0	$12	$189	$20	14.1
Storage B4	2	Linear Fluorescent - EST12: 4' T12 (34W) - 2L	Wall Switch	S	72	1,000	2, 4	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.1	114	0	$15	$254	$20	15.7
Storage B5 #1	1	Linear Fluorescent - T8: 8' T8 (59W) - 2L	Wall Switch	S	110	1,000	3	Relamp	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	1,000	0.0	42	0	$5	$89	$20	12.6
Storage B5 #2	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,000	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.0	62	0	$8	$73	$20	6.6
Storage Book Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,000	3, 4	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	690	0.0	48	0	$6	$153	$10	22.7
Storage Book Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,000	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	690	0.1	139	0	$18	$226	$30	10.9

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior	3	Compact Fluorescent: (1) 26W Double Biaxial Plug-In Lamp	Timeclock		26	4,380	3	Relamp	No	3	LED Lamps: GX23 (Plug-In) Lamps	Timeclock	19	4,380	0.0	92	0	$13	$38	$3	2.8
Exterior	3	LED - Fixtures: Security	Timeclock		40	4,380		None	No	3	LED - Fixtures: Security	Timeclock	40	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior	2	Metal Halide: (1) 70W Lamp	Timeclock		95	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	21	4,380	0.0	648	0	$88	$412	$100	3.5

Motor Inventory & Recommendations

		Existing Conditions									Proposed Conditions					Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	**Motor Quantity**	**Motor Application**	**HP Per Motor**	**Full Load Efficiency**	**VFD Control?**	**Manufacturer**	**Model**	**Remaining Useful Life**	**Annual Operating Hours**	**ECM #**	**Install High Efficiency Motors?**	**Full Load Efficiency**	**Install VFDs?**	**Number of VFDs**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Estimated M&L Cost ($)**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Classrooms	Unit ventilators	50	Fan Coil Unit	0.3	60.0%	No	Airdale		W	1,300		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Cafeteria	P3, P4 Mechanical - Cafeteria	2	Chilled Water Pump	5.0	85.5%	No			W	720	7	No	89.5%	Yes	2	2.0	2,545	0	$346	$8,394	$1,800	19.1
Boiler Room	Boiler	2	Combustion Air Fan	5.0	82.5%	No			W	280		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various	1	Exhaust Fan	0.3	60.0%	No			W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various	1	Exhaust Fan	0.5	60.0%	No			W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	DHE	1	DHW Circulation Pump	0.5	60.0%	No	Bell & Gossett		W	8,760		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	P1, P2 - Boiler	2	Heating Hot Water Pump	15.0	93.0%	No	US motors		W	580	8	No	93.0%	Yes	2	2.9	5,234	0	$711	$14,082	$2,400	16.4
Mechanical Elevator Room	Elevator	1	Other	20.0	90.0%	No			W	0		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Boiler Room	Oil Pump	2	Process Pump	0.5	69.9%	No			W	280		No	69.9%	No		0.0	0	0	$0	$0	$0	0.0
Corridor Basement	Sump Pump	1	Process Pump	0.3	60.0%	No			W	500		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Various	4	Supply Fan	1.0	84.5%	No	Trane	CGAFC404AAA	B	2,745		No	84.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical - Cafeteria	AHU 3 Cafeteria	1	Supply Fan	10.0	91.7%	No				2,806	6	No	91.7%	Yes	1	2.9	8,560	0	$1,164	$5,152	$1,100	3.5
Mechanical - Cafeteria	AHU 5Gymnasium	1	Supply Fan	10.0	91.7%	No				2,806	6	No	91.7%	Yes	1	2.9	8,560	0	$1,164	$5,152	$1,100	3.5

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Nurses Office - 108	Nurses Office - 108	1	Window AC	2.00		11.00		Frigidaire	FFRE24	W		No							0.0	0	0	$0	$0	$0	0.0
Principals Office	Principals Office	1	Window AC	1.25		11.00		Frigidaire	KK7240	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 209	Classroom 209	1	Window AC	2.00		11.00		Frigidaire	FFRE24	W		No							0.0	0	0	$0	$0	$0	0.0
Computer Lab 208	Computer Lab 208	1	Window AC	1.00		11.00		Frigidaire	FFRE12	W		No							0.0	0	0	$0	$0	$0	0.0
Office - 207A	Office - 207A	1	Window AC	1.25		10.70		Frigidaire	FAM156R1A	B	9	Yes	1	Window AC	1.25		12.00		0.1	128	0	$17	$794	$0	45.8
Library	Library	1	Window AC	2.00		10.80		Frigidaire	KKK72104	B	9	Yes	1	Window AC	2.00		12.00		0.1	187	0	$25	$1,065	$0	42.0
Office - 306B	Office - 306B	1	Window AC	0.83		9.50		Frigidaire	FAK103J1V1	B	9	Yes	1	Window AC	0.83		12.00		0.1	184	0	$25	$643	$0	25.7
Classroom 412A	Classroom 412A	1	Window AC	0.83		10.00		GE	AMD10ABM1	B	9	Yes	1	Window AC	0.83		12.00		0.1	140	0	$19	$643	$0	33.8
Classroom B6	Classroom B6	1	Window AC	1.25		11.90		Frigidaire	FFRE1533U10	W		No							0.0	0	0	$0	$0	$0	0.0
Office - CR2	Office - CR2	1	Ductless Mini-Split AC	2.50		10.30		Johnson Controls	TIDM030B21E	B	9	Yes	1	Ductless Mini-Split AC	2.50		18.00		0.6	1,047	0	$142	$6,523	$0	45.9
Office - VP	Office - VP	1	Ductless Mini-Split AC	2.50		10.30		Johnson Controls	TIDM030B21E	B	9	Yes	1	Ductless Mini-Split AC	2.50		18.00		0.6	1,047	0	$142	$6,523	$0	45.9
Lounge 112A	Lounge 112A	1	Ductless Mini-Split AC	0.75		9.80		Sanyo	KH0912W	B	9	Yes	1	Ductless Mini-Split AC	0.75		18.00		0.2	351	0	$48	$5,327	$0	111.5
Lounge 201a	Lounge 201a	1	Ductless Mini-Split AC	2.50		10.30		Johnson Controls	TIDM030B21E	B	9	Yes	1	Ductless Mini-Split AC	2.50		18.00		0.6	1,047	0	$142	$6,523	$0	45.9
Roof	Roof	1	Ductless Mini-Split AC	5.00		12.50		York	TVAHP060B21S	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Roof	1	Ductless Mini-Split AC	5.00		12.50		York	TVAHP060B21S	W		No							0.0	0	0	$0	$0	$0	0.0
Stairs F	Stairs F	1	Electric Resistance Heat		12.63		1 COP					No							0.0	0	0	$0	$0	$0	0.0

Electric Chiller Inventory & Recommendations

		Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Various	1	Air-Cooled Scroll Chiller	40.00	Trane	CGAFC404AAA	B	10	Yes	1	Air-Cooled Scroll Chiller	Constant	40.00	1.17	0.88	3.2	3,426	0	$466	$55,002	$800	116.4

Space Heating Boiler Inventory & Recommendations

		Existing Conditions						Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	All school	2	Non-Condensing Hot Water Boiler	4,696	Smith	Mills 4500A	B	11	Yes	2	Non-Condensing Hot Water Boiler	4,696	85.00%	Ec	0.0	0	230	$3,406	$160,935	$0	47.3

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler room	DHW	12	4	2.00	0.0	0	3	$32	$29	$8	0.7
Boiler room	DHW	12	3	3.00	0.0	0	4	$37	$22	$6	0.4

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	Restrooms	1	Storage Tank Water Heater (> 50 Gal)	AO Smith	BTC 197 920	B	13	Yes	1	Storage Tank Water Heater (> 50 Gal)	Natural Gas	93.00%	UEF	0.0	0	7	$73	$12,762	$690	165.2
Boiler Room	Restrooms	2	Storage Tank Water Heater (> 50 Gal)	AO Smith	BTR197110	B	13	Yes	2	Storage Tank Water Heater (> 50 Gal)	Natural Gas	93.00%	UEF	0.0	0	7	$73	$25,886	$1,393	335.2

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions				Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Manufacturer	Model	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	Trenton	TPLP209MAS1D R8-ESP		No	No	No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Medium Temp Freezer (0F to 30F)	McQuay		14	Yes	No	No	0.0	618	0	$84	$303	$40	3.1

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Cafeteria	1	Refrigerator Chest			No		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	Manufacturer	Model	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	2	Electric Convection Oven (Full Size)	Duke Manufacturing company		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Winston CVAP		No		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
PS5	8	Coffee Machine	200	No		
PS5	50	Desktop	145	No		
PS5	50	Laptop	70	No		
PS5	9	Microwave	900	No		
PS5	1	Server	1,500	No		
PS5	1	Deli Slicer	400	No		
PS5	1	Paper shredder	400	No		
PS5	63	Printer Medium	80	No		
PS5	3	Printer Large	200	No		
PS5	8	Refrigerator mini	60	No		
PS5	5	Residential refrigerator	200	No		
PS5	2	Serving table	1,500	No		
PS5	52	Smart Board	5	No		
PS5	2	Television	100	No		
PS5	4	Water cooler	550	No		
PS5	650	Chrome book	40	No		

Custom (High Level) Measure Analysis

Installation of an Energy Management System

Building Square Footage	97,580	Fuel Utility Rate	$14.815 MMBtu
Percent of Conditioned Area Impacted	95%	Blended Electric Utility Rate	$0.136 kWh

Existing Conditions						Proposed Conditions					Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	Remaining Useful Life	Total HVAC Motor Usage kWh	Total HVAC Electric Usage kWh	Total HVAC Fuel Usage MMBtu	Description	% Savings HVAC Motor Usage kWh	% Savings HVAC Electric Usage kWh	% Savings HVAC Fuel Usage MMBtu	Estimated Cost per Sqft	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Base Incentives	Enhanced Incentives	Total Incentives	Total Net Cost	Payback w/o Incentives in Years	Simple Payback w/ Incentives in Years
Limited/No HVAC Controls	HVAC Equipment & Systems	15	80,111	67,817	3,324	Installation of an Energy Management System	10%	10%	10%	$2.00	0.00	14,793	332	$6,935	$185,402	$0	$0	$0	$185,402	26.73	26.73

Appendix B: ENERGY STAR Statement of Energy Performance

Energy use intensity (EUI) is presented in terms of *site energy* and *source energy*. Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

West New York Public School No. 5

Primary Property Type: K-12 School
Gross Floor Area (ft²): 97,580
Built: 1913

For Year Ending: December 31, 2019
Date Generated: October 18, 2021

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
West New York Public School No. 5 5401 Hudson Avenue West New York, New Jersey 07093	West New York Board of Education 6028 Broadway West New York, NJ 07093 (201) 553-4000	Dean Austin 6028 Broadway West New York, NJ 07093 (201) 553-4000 x 30063 daustin@wnyschools.net

Property ID: 15533185

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
47.4 kBtu/ft²

Source EUI
70.2 kBtu/ft²

Annual Energy by Fuel	
Fuel Oil (No. 2) (kBtu)	3,307,897 (72%)
Natural Gas (kBtu)	106,063 (2%)
Electric - Grid (kBtu)	1,211,995 (26%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	73
National Median Source EUI (kBtu/ft²)	108
% Diff from National Median Source EUI	-35%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	364

Signature & Stamp of Verifying Professional

I __________________ (Name) verify that the above information is true and correct to the best of my knowledge.

LP Signature: ______________________Date: ___________

Licensed Professional

____ ________
,
(____)____-______
____

Professional Engineer or Registered Architect Stamp
(if applicable)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate fiscal savings associated with measures. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
Btu	*British thermal unit*: a unit of energy equal to the amount of heat required to increase the temperature of one pound of water by one-degree Fahrenheit.
CHP	*Combined heat and power*. Also referred to as cogeneration.
COP	*Coefficient of performance*: a measure of efficiency in terms of useful energy delivered divided by total energy input.
Demand Response	Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives.
DCV	*Demand control ventilation*: a control strategy to limit the amount of outside air introduced to the conditioned space based on actual occupancy need.
US DOE	*United States Department of Energy*
EC Motor	*Electronically commutated motor*
ECM	*Energy conservation measure*
EER	*Energy efficiency ratio*: a measure of efficiency in terms of cooling energy provided divided by electric input.
EUI	*Energy Use Intensity:* measures energy consumption per square foot and is a standard metric for comparing buildings' energy performance.
Energy Efficiency	Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing the operation of energy use systems. Unlike conservation, which involves some reduction of service, energy efficiency provides energy reductions without sacrifice of service.
ENERGY STAR	ENERGY STAR is the government-backed symbol for energy efficiency. The ENERGY STAR program is managed by the EPA.
EPA	*United States Environmental Protection Agency*
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
GHG	*Greenhouse gas* gases that are transparent to solar (short-wave) radiation but opaque to long-wave (infrared) radiation, thus preventing long-wave radiant energy from leaving Earth's atmosphere. The net effect is a trapping of absorbed radiation and a tendency to warm the planet's surface.
gpf	*Gallons per flush*

gpm	*Gallon per minute*
HID	*High intensity discharge:* high-output lighting lamps such as high-pressure sodium, metal halide, and mercury vapor.
hp	*Horsepower*
HPS	*High-pressure sodium*: a type of HID lamp.
HSPF	*Heating seasonal performance factor:* a measure of efficiency typically applied to heat pumps. Heating energy provided divided by seasonal energy input.
HVAC	*Heating, ventilating, and air conditioning*
IHP 2014	US DOE Integral Horsepower rule. The current ruling regarding required electric motor efficiency.
IPLV	*Integrated part load value:* a measure of the part load efficiency usually applied to chillers.
kBtu	One thousand British thermal units
kW	*Kilowatt*: equal to 1,000 Watts.
kWh	*Kilowatt-hour*: 1,000 Watts of power expended over one hour.
LED	*Light emitting diode*: a high-efficiency source of light with a long lamp life.
LGEA	*Local Government Energy Audit*
Load	The total power a building or system is using at any given time.
Measure	A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption.
MH	*Metal halide*: a type of HID lamp.
MBh	*Thousand Btu per hour*
MBtu	*One thousand British thermal units*
MMBtu	*One million British thermal units*
MV	*Mercury Vapor:* a type of HID lamp.
NJBPU	*New Jersey Board of Public Utilities*
NJCEP	*New Jersey's Clean Energy Program:* NJCEP is a statewide program that offers financial incentives, programs and services for New Jersey residents, business owners and local governments to help them save energy, money, and the environment.
psig	Pounds per square inch gauge
Plug Load	Refers to the amount of power used in a space by products that are powered by means of an ordinary AC plug.
PV	*Photovoltaic:* refers to an electronic device capable of converting incident light directly into electricity (direct current).

SEER	*Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input.
SEP	*Statement of energy performance:* a summary document from the ENERGY STAR Portfolio Manager.
Simple Payback	The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings.
SREC	*Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array.
TREC	*Transition Incentive Renewable Energy Certificate:* a factorized renewable energy certificate you can earn from the state for energy produced from a photovoltaic array.
T5, T8, T12	A reference to a linear lamp diameter. The number represents increments of 1/8th of an inch.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
therm	100,000 Btu. Typically used as a measure of natural gas consumption.
tons	A unit of cooling capacity equal to 12,000 Btu/hr.
Turnkey	Provision of a complete product or service that is ready for immediate use.
VAV	*Variable air volume*
VFD	*Variable frequency drive*: a controller used to vary the speed of an electric motor.
WaterSense®	The symbol for water efficiency. The WaterSense® program is managed by the EPA.
Watt (W)	Unit of power commonly used to measure electricity use.